

Francisco. The unemerged mummy was retained at the Plant Pest Diagnostic Center of the California Department of Food and Agriculture, Sacramento.

Acknowledgment.—Leo Caltagirone of the University of California, Berkeley conducted the dissections. Ray Gill of the California Department of Food and Agriculture identified the *Phenacoccus madeirensis* mummy and Junji Hamai of the University of California, Berkeley identified the plants.

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Scientific Note

***VESPULA GERMANICA* (FABR.) IN SOUTHERN CALIFORNIA (HYMENOPTERA: VESPIDAE)**

The German yellowjacket, *Vespula germanica* (Fabr.) is native to Europe, northern Africa and western Asia (Spradbery. 1973. Wasps, Univ. Washington Press). Isolated specimens, often initially misidentified, have been occasionally taken in the USA since 1891 (Menke & Snelling. 1975. Coop. Econ. Ins. Rep., 25: 193–200). It has been known to be breeding in the USA since Wagner & Reiersen (1971. Natl. Pest Contr. Oper. News, 31: 6–7, 30–32) described a nest of the species found in New Jersey in 1971. This wasp has spread throughout the northeast quadrant of the USA (MacDonald & Akre. 1984. Entomol. News, 95: 5–8) and into the Pacific Northwest (Akre, Ramsey, Grable, Baird & Stanford. 1989. Pan-Pac. Entomol., 65: 79–88). On the west coast, *V. germanica* has been previously reported as far south as San Francisco (Gambino. 1987. Pan-Pac. Entomol., 63: 358). Here we report the establishment of this wasp in southern California.

Workers were first collected in southern California in Los Angeles County on 31 Jan 1991 (Garrison. 1993. L. A. Co. Agric. Comm. Off. Bulletin, 2 pp., and pers. comm.). In Orange County, *V. germanica* colonies were collected from wall voids on 29 Aug 1991 in Los Alamitos, and 30 Jun 1992 in Cypress (N. Nisson, pers. comm.). On 31 May 1993 in Los Angeles, DAR identified 3 queens and 10 males collected from inside a residence, but no nest could be located. PKV identified a large active nest discovered 25 Jul 1993 in a closet of a vacant, earthquake-damaged house in Claremont (Fig 1.). The plasterboard had fallen away from the wall allowing the wasps to expand the nest from a wall void into an exposed closet space. The nest dimensions were approximately 1 m long by 0.5 m wide. Given its large size, this colony may have overwintered at least one year. On 17 Nov 1993, an active nest was identified by RSV in Riverside built around the trunk of an ornamental date palm tree. This nest was founded in a cavity among the axils, and was subsequently expanded and wrapped around the terminal axil bases

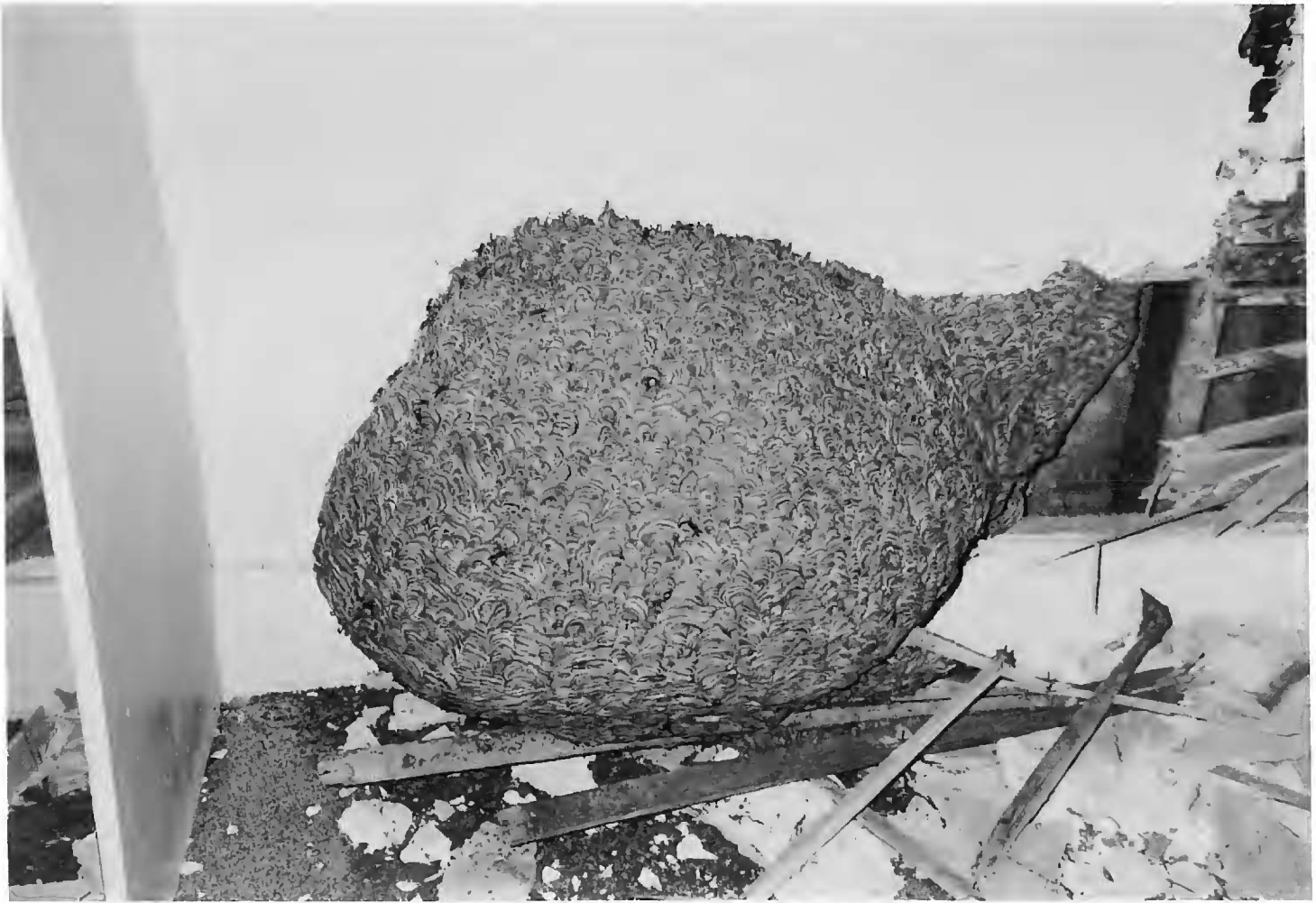


Figure 1. Nest of *Vespula germanica* found in the closet of an vacant, earthquake-damaged house in Claremont, CA.

for approximately 1.5 m with a uniform height of 1 m. There were multiple entrances through the envelope of the nest carton.

Vespula germanica now appears to be firmly established in southern California, being found consecutively for several years, and is probably overwintering or building perennial nests since specimens are being taken throughout the year, nests sometimes attain very great size, and males have been found in the spring.

These findings represent the southernmost area in the USA from which *V. germanica* has been collected. It has spread westward, but not far southward from its introduction in the northeastern USA, (MacDonald, Akre & Keyel. 1980. Bull. Entomol. Soc. Amer., 26: 436–442). In the Palearctic, *V. germanica* extends into subtropical climates. Its successful invasion of subtropical southern California, in varied urban environments from cooler, coastal areas (Los Angeles and Orange Counties) to the hot, dry inland desert areas (Riverside County) suggests that temperature alone does not limit its distribution in the eastern USA.

Vespula germanica exhibits behavioral differences in America in comparison with its European form. In particular, these wasps, in North America, most often build nests in cavities or voids whereas subterranean nests are predominately built in the Palearctic region (MacDonald, Akre & Keyel. 1980). Since the southern California nests have been found in both structural and landscape situations, its status as a pest to humans may increase the incidence of yellowjacket related stinging episodes.

Voucher specimens identified by the authors have been deposited in the museum collections of the University of California, Riverside.

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Scientific Note

DIGGER WASPS (HYMENOPTERA: SPHECIDAE) AND ROBBER FLIES (DIPTERA: ASILIDAE) AS PREDATORS OF GRASSHOPPERS (ORTHOPTERA: ACRIDIDAE) ON MONTANA RANGELAND

Digger wasps and robber flies have been reported to take short-horned grasshoppers as prey, with some predators apparently specialized upon Acrididae (Rees, N. E. 1973. USDA-ARS Tech. Bull. 1460). While conducting research on grasshoppers and robber flies during the summers of 1987–1993, I obtained 56 records of three species of digger wasps and five species of robber flies preying on grasshoppers at three sites in SW Montana. These records are reported here, along with brief descriptions of nesting behavior of the wasps.

I made all observations at three locations: 1) Madison River Site (MRS)—14 km south of Three Forks, Gallatin County, Montana (45°45' N, 111°35' W), 2) Dead Cow Pasture (DCP)—5 km south of Three Forks, 3) Horseshoe Hills (HH)—6 km NE of Logan, Gallatin County Montana. All three sites were grassland, with the predominant grasses at MRS and HH being *Stipa comata* Trinius & Ruprecht and *Bouteloua gracilis* (Humboldt et al.) Lagasca y Segura ex. Steudal. At DCP, these grasses had been replaced by crested wheatgrass, *Agropyron cristatum* (L.) Gaertner and alfalfa, *Medicago sativa* L. as part of a range management program in the 1960s. Prey records are listed by species, where possible, with the nymphal stage (i.e., instar in roman numerals) or adult sex given in parentheses.

North American species of the sphecid genus *Prionyx* prey solely upon acridid grasshoppers and, except for one species, place their prey within shallow unicellular nests (Evans, H. E. 1958. Ann. Entomol. Soc. Amer., 51: 177–186). The prey I collected from nests of seven *Prionyx atratus* (Lepelletier) females included four grasshopper species, *Aulocara elliotti* Thomas (2 f), *Melanoplus packardii* Scudder (2 f), *Melanoplus sanguinipes* (Fabr.) (2 f), and *Trachyrachis kiowa* Thomas (f). All were collected at MRS, except the two *M. sanguinipes* which were collected at DCP.